

U.S. Patent Application Serial No. **10/543,185**
Response filed February 25, 2010
Reply to OA dated November 23, 2009

REMARKS

Claims 1-4, 6, 7 and 10-17 are pending in this application, with claims 1-4 and 10-12 withdrawn from consideration. No amendment is made in this Response. It is believed that this Response is fully responsive to the Office Action dated November 23, 2009.

Claims 6-7 and 13-17 are rejected under 35 U.S.C. §103(a) as being unpatentable over Barney in 2002/0110180 in view of Petruska in 7,226,953. (Office action paragraph no. 4)

The rejection of claims 6-7, 13, 14, 16 and 17 is moot in view of Applicant's perfection herein of the claim for foreign priority, which removes Petruska '953 as prior art for these claims. The rejection of claim 15 is respectfully traversed.

Specifically, the present application is a 371 National stage application of an international application filed on January 23, 2004, and claims foreign priority of two applications: JP2003-15490 filed January 24, 2003, and JP2003-391685, filed on November 21, 2003.

Petruska '953 was filed on November 17, 2003, and this date is therefore the 102(e) date for this reference. The claim for priority of JP2003-15490 therefore predates the Petruska '953 reference.

Applicant here perfects the claim for priority of JP2003-15490 with the attached verified English translation of this document.

Applicant submits that claims 6-7, 13, 14, 16 and 17 of the present application are fully supported by the JP2003-15490 priority document.

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Specifically, the recitation in claim 6 of a fluorescent material comprising semiconductor ultrafine particles having 20% or more fluorescence dispersed in a glass matrix is generally supported by claim 5 (item 5) of the priority document. The recitation that the glass is formed by a sol-gel process using an alkoxysilane is generally supported by claim 7 (item 7) of the priority document, and the limitation on group X in the General Formula is supported by paragraph [0048] on pages 20-21 of the verified translation. The limitation of present claim 7 is also supported by claim 5 of the priority document.

The limitations of claim 13 are supported by claim 17 of the priority document. The limitations of claims 14, 16 and 17 are supported by paragraphs [0048], [0026] and [0026], respectively.

Applicant notes that the priority document supports a Vickers hardness of 50 (claim 11 of the priority document), but does not fully support the limitation of 20 or higher in claim 15. However, Applicant submits that claim 15 is not obvious over the cited references, arguing as follows.

In the rejection, Barney is cited for teaching a temperature-sensing composition that includes a matrix composition and semiconductor nanocrystals exhibiting fluorescence. The Examiner cites [0018] as disclosing that the quantum efficiency of the nanocrystals can be greater than 20%, and cites [0030] as disclosing that the matrix can be a sol-gel derived matrix. The Examiner cites [0032] for disclosing precursors including hydrolyzable compositions including silicon alkoxide. The

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Examiner states that Barney fails to teach functionally modified triethoxysilane (i.e., the General Formula in claim 6) as a sol-gel precursor.

Petruska is cited for disclosing that the loading amount in sol-gel glasses can be optimized by a ligand exchange process on the semiconductor particles. Petruska is cited as disclosing up to 20 vol% of quantum dots, and the Examiner calculates that using the quantum dots of Barney, a molarity of 0.002 mol/l can be obtained. The Examiner states that the ligands on the particles are substituted with a ligand having the formula X-Z-Y, and that using these ligands in conjunction with the silicon alkoxides of Barney would form a sol-gel glass of the same composition as claimed. The Examiner cites Fig. 1 of Petruska as showing the structure of an exemplary glass in which an amine passivation agent integrally links through an alkyl group to the metal elements within the sol-gel matrix.

The Examiner admits that Barney does not disclose a sol-gel using the organoalkoxysilane of the General Formula $X-Si(OR)_3$ of claim 6, and Petruska is cited for disclosing a system that yields the same composition as the sol-gel process of claim 6. Petruska provides a process for preparing a solid composite including colloidal nanocrystals dispersed within a sol-gel matrix, prepared by reacting colloidal nanocrystals passivated with hydrophobic ligands with a multifunctional compound of formula $X_x-(Z_n)-Y_y$ (see column 2, lines 24 and ff.).

The sol-gel process of Petruska is generally described at column 5, lines 18-43, and precursors include metal alkoxide compounds, metal halide compounds, metal hydroxide compounds, and combinations thereof and the like, where the metal is silicon, titanium, zirconium,

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aluminum, vanadium, iron, chromium, tin, tantalum or cerium (column 5, lines 29-35). Specific examples are given at column 5, lines 38-43, and the only silicon alkoxide compound mentioned is tetraethoxysilane (column 5, line 41).

However, in General Formula $X-Si(OR)_3$ in present base claim 6, X does **not** represent an alkoxide, and group X is **attached via a Si-C bond**. This is clearly recited since X is distinguished from the alkoxy group (OR). The present specification states at page 16, line 10: “at least one of four bonds of silicon is bonded with a carbon atom”

By contrast, there is no disclosure of Si-C or of any metal-carbon bond in column 5, lines 28-31 of Petruska. The example of tetraethoxysilane at column 5, line 41, has four alkoxy groups and would **not** meet the limitations of the General Formula in claim 6.

Therefore, Petruska does not disclose the process limitation of claim 6. The Examiner implies that the combination of Petruska and the silicon alkoxides of Barney results in the same structure as resulting from the process limitation of claim 6: “The use of the above mentioned ligands would result in a sol-gel glass of the same chemical structure as the sol-gel glass claimed” (page 4, lines 10-12, of the Office action).

However, Applicant respectfully submits that the Examiner is incorrect. The Examiner refers to the example in Fig. 1 of Petruska, which is a NQD-titania nanocomposite showing Ti-O bonds. In particular, **all four of the bonds of the titanium are Ti-O bonds**. If this were the Si analogue, all four of the bonds would be Si-O bonds.

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In the invention of claim 6, the final product will retain the Si-X group, that is, retain the Si-C bond. The specification states at page 17, line 12, that: "the functional group shown by X in the above formula is combined with the surface of the ultrafine particles, ...," that is, the group X is attached to the Si in the final product.

Therefore, no combination of Barney and Petruska can provide the material recited in base claim 6 of the present invention. Claim 15 is therefore not obvious over Barney and Petruska, taken separately or in combination.

If, for any reason, it is felt that this application is not now in condition for allowance, the Examiner is requested to contact the applicants' undersigned agent at the telephone number indicated below to arrange for an interview to expedite the disposition of this case.

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In the event that this paper is not timely filed, the applicants respectfully petition for an appropriate extension of time. Please charge any fees for such an extension of time and any other fees which may be due with respect to this paper, to Deposit Account No. 01-2340.

Respectfully submitted,

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Enclosures: Petition for Extension of Time
Verified English Translation of JP 2003-15490

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